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Electronic Materials Principles of Electrical Engineering Materials and Devices Reliability and Failure of Electronic Materials and Devices Principles of Electronic Materials and Devices Flexible Electronics Electronic Materials and Devices Fatigue of Electronic Materials Single Crystals of Electronic Materials Electrical Characterization of Organic Electronic Materials and Devices Surfaces and Interfaces of Electronic Materials Physics of Electronic Materials Electronic Materials Science Electronic Materials Handbook of Electronic Materials Electronic Materials: The Oligomer Approach Smart Electronic Materials Dielectric Spectroscopy of Electronic Materials Electronic Properties of Materials Introduction To Electronic Materials For Engineers, An (2nd Edition) Introduction to the Electronic Properties of Materials Journal of Electronic Materials Springer Handbook of Electronic and Photonic Materials Modern Electronic Materials Iontronics Printed Electronics Chemical Vapor Deposition Corrosion and Reliability of Electronic Materials and Devices Electronic Properties of Materials Electronic Materials Advanced Electrical and Electronics Materials Defects in Advanced Electronic Materials and Novel Low Dimensional Structures Organic Electronic Materials A Literature Survey on the Purification of Electronic Materials

Properties of Electronic Materials Nanoelectronics and Information Technology ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS Handbook of Electronic Package Design Chemical Vapor Deposition Electronic Materials Handbook of Electronic Materials: Linear electrooptic modular materials

In early 1987 I was attempting to develop a CVD-based tungsten process for Intel. At every step ofthe development, information that we were collecting had to be analyzed in light of theories and hypotheses from books and papers in many unrelated subjects. Thesesources were so widely different that I came to realize there was no unifying treatment of CVD and its subprocesses. More interestingly, my colleagues in the industry were from many disciplines (a surface chemist, a mechanical engineer, a geologist, and an electrical engineer werein my group). To help us understand the field of CVD and its players, some of us organized the CVD user's group of Northern California in 1988. The idea for writing a book on the subject occurred to me during that time. I had already organized my thoughts for a course I taught at San Jose State University. Later Van Nostrand agreed to publish my book as a text intended for students at the senior/first year graduate level and for process engineers in the microelectronics industry, This book is not intended to be bibliographical, and it does not cover every new material being studied for chemical vapor deposition. On the other hand, it does present the principles of CVD at a fundamental level while uniting them with the needs of the microelectronics industry. Single Crystals of Electronic Materials: Growth and Properties is a complete overview of the state of the art growth of bulk semiconductors. It is not only a valuable update of the body of information on crystal growth of well-established electronic materials such as silicon, III-V, II-VI and IV-VI semiconductors, but includes chapters on novel semiconductors including wide bandgap oxides (ZnO Ga2O3, In2O3, Al2O3), nitrides (AIN and GaN) and diamond. Each chapter focuses in-depth on a material, providing a comprehensive overview including: Applications and requirements of the electronic material Thermodynamic properties and definition of usable growth methods Schematics of growth methods for the material Description of up-to-date growth technologies and processes Tailoring of crystal properties via growth parameters Benefits of computer modelling Doping issues and reduction of defect density State-of-the art of the material New trends and future developments The second, updated edition of this essential reference book provides a wealth of detail on a wide range of electronic and photonic materials, starting from fundamentals and building up to advanced topics and applications. Its extensive coverage, with clear illustrations and applications, carefully selected chapter sequencing and logical flow, makes it very different from other electronic materials handbooks. It has been written by professionals in the field and instructors who teach the subject at a university or in corporate laboratories. The Springer Handbook of Electronic and Photonic Materials, second edition, includes practical applications used as examples, details of experimental techniques, useful tables that summarize equations, and, most importantly, properties of various materials, as well as an extensive glossary. Along with significant updates to the content and the references, the second edition includes a number of new chapters such as those covering novel materials and selected applications. This handbook is a valuable resource for graduate students, researchers and practicing professionals working in the area of electronic, optoelectronic and photonic materials. Electroactive oligomers form an important class of advanced materials for the development of new devices such as thin-film, flexible batteries; semiconductors; large-area optical displays; and sensors. In addition, the study of oligomeric model compounds is an essential prerequisite for understanding and developing polymers for electronics and optoelectronics applications. Written and edited by leading scientists in the field, this applications-oriented handbook represents the first comprehensive, systematic study of electroactive oligomeric materials. Special emphasis is placed on a critical review of the literature; relevant materials and technical data are collected in tables throughout. Includes - materials synthesis - structure--property relationship as a function of chain-length - applications in optics and electronics - oligomers as models for polymers - the role of oligomers in tomorrow's technology? Electronic Materials - The Oligomer Approach offers a stimulating combination of basic concepts and practical applications. It is sure to become a standard reference source that no-one working in the field can do without. A thorough introduction to fundamental principles andapplications From its beginnings in metallurgy and ceramics, materials sciencenow encompasses such high- tech fields as microelectronics,polymers, biomaterials, and nanotechnology. Electronic MaterialsScience presents the fundamentals of the subject in a detailedfashion for a multidisciplinary audience. Offering a higher-leveltreatment than an undergraduate textbook provides, this textbenefits students and practitioners not only in electronics andoptical materials science, but also in additional cutting-edgefields like polymers and biomaterials. Readers with a basic understanding of physical chemistry or physicswill appreciate the text's sophisticated presentation of today'smaterials science. Instructive derivations of important formulae,usually omitted in an introductory text, are included here. Thisfeature offers a useful glimpse into the foundations of how thediscipline understands such topics as defects, phase equilibria,and mechanical properties. Additionally, concepts such asreciprocal space, electron energy band theory, and thermodynamicsenter the discussion earlier and in a more robust fashion than inother texts. Electronic Materials Science also features: * An orientation towards industry and academia drawn from theauthor's experience in both arenas * Information on applications in semiconductors, optoelectronics,photocells, and nanoelectronics * Problem sets and important references throughout * Flexibility for various pedagogical needs Treating the subject with more depth than any other introductorytext, Electronic Materials Science prepares graduate andupper-level undergraduate students for advanced topics in thediscipline and gives scientists in associated disciplines a clearreview of the field and its leading technologies. Electronic materials are a dominant factor in many areas of modern technology. The need to understand'them is paramount; this book addresses that need. The main aim of this volume is to provide a broad unified view of electronic materials, including key aspects of their science and technology and also, in many cases, their commercial implications. It was considered important that much of the contents of such an overview should be intelligible by a broad audience of graduates and industrial scientists, and relevant to advanced undergraduate studies. It should also be up to date and even looking forward to the future. Although more extensive, and written specifically as a text, the resulting book has much in common with a short course of the same name given at Coventry Polytechnic. The interpretation of the term "electronic materials" used in this volume is a very broad one, in line with the initial aim. The principal restriction is that, with one or two minor exceptions relating to aspects of device processing, for example, the materials dealt with are all active materials. Materials such as simple insulators or simple conductors, playing only a passive role, are not singled out for consider ation. Active materials might be defined as those involved in the processing of signals in a way that depends crucially on some specific property of those materials, and the immediate question then concerns the types of signals that might be considered. This graduate text explains the physical properties and applications of a wide range of smart materials. An Introduction to Electronic Materials for Engineers aims to give a basic understanding and comprehensive overview of a wide range of materials, such as conducting materials, semiconductors, magnetic materials, optical materials, dielectric materials, superconductors, thermoelectric materials and ionic materials. The new chapters added into this latest edition include thin film electronic materials, organic electronic materials and nanostructured materials. These chapters aim to reflect the new developments made in electronic materials and nanotechnology research towards the design and fabrication of modern equipment and electronic devices.This book is designed for undergraduate engineering and technology students who have background knowledge of physics and chemistry, as well as for engineers who work on materials processing or application, or electric/electronic engineering.It emphasizes on the synthesis, performance and application of electronic materials and will enable readers to understand and relate to the devices and materials. Electronic Materials is about materials that are used for their electrical and magnetic properties, rather than their mechanical properties. Exploiting electronic properties in many products calls for careful manipulation of materials' structures at the atomic and microstructural levels. The book explains the scientific models needed to guide those manipulations and describes how they are commercially exploited inside electronic devices. Books are seldom finished. At best, they are abandoned. The second edition of "Electronic Properties of Materials" has been in use now for about seven years. During this time my publisher gave me ample opportunities to update and improve the text whenever the Ibook was reprinted. There were about six of these reprinting cycles. Eventually, however, it became clear that substantially more new material had to be added to account for the stormy developments which occurred in the field of electrical, optical, and magnetic materials. In particular, expanded sections on flat-panel displays (liquid crystals, electroluminescence devices, field emission displays, and plasma dis. : plays) were added. Further, the recent developments in blue- and green emitting LED's and in photonics are included. Magnetic storage devices also underwent rapid development. Thus, magneto-optical memories, magneto resistance devices, and new' magnetic materials needed to be covered. The sections on dielectric properties, ferroelectricity, piezoelectricity, electrostric tion, and thermoelectric properties have been expanded. Of course, the entire text was critically reviewed, updated, and improved. However, the most extensive change I undertook was the conversion of all equations to SI units throughout. In most of the world and in virtually all of the interna tional scientific journals use of this system of units is required. If today's students do not learn to utilize it, another generation is "lost" on this matter. In other words, it is important that students become comfortable with SI units. This book brings together selected contributions both on the fundamental information on the physics and chemistry of these materials, new physical ideas and decisive experiments. It constitutes both an insightful treatise and a handy reference for specialists and graduate students working in solid state physics and chemistry, material science and related fields. The book has been written in a lucid and systematic manner with necessary mathematical derivations, illustrations, examples and practise exercises providing detailed description of the materials used in electrical and electronics engineering and their applications. Beginning with the atomic structure of the materials, the book deals with the behaviour of dielectrics and their properties under the influence of DC and AC fields. It covers the magnetic properties of materials including soft and hard magnetic materials and their applications. The text discusses fabrication techniques and the basic physics involved in the operation of the semiconductors, junction transistors and rectifiers. It includes detailed description of optical properties of the materials (optical materials), photovoltaic materials and the materials used in lasers and optical fibres. It also incorporates the latest information on the materials used for the direct energy conversion and fuel cell technologies. This book is primarily intended for undergraduate students of electrical engineering and electrical and electronics engineering. Key features • Contains sufficient numbers of solved numerical examples. • Includes a set of review questions and a list of references at the end of each chapter. • Provides a set of numerical problems in some of the chapters, wherever required. • Contains more than 150 diagrammatic illustrations for easy understanding of the concepts. The field of organic electronics promises exciting new technologies based on inexpensive and mechanically flexible electronic devices, and is now seeing the beginning of commercial success. On the sidelines of this increasingly well-established field are several emerging technologies with innovative mechanisms and functions that utilize the mixed ionic/electronic conducting character of conjugated organic materials. Iontronics: Ionic Carriers in Organic Electronic Materials and Devices explores the potential of these materials, which can endow electronic devices with unique functionalities. Fundamental science and applications With contributions from a community of experts, the book focuses on the use of ionic functions to define the principle of operation in polymer devices. It begins by reviewing the scientific understanding and important scientific discoveries in the electrochemistry of conjugated polymers. It examines the known effects of ion incorporation, including the theory and modulation of electrochemistry in polymer films, and it explores the coupling of electronic and ionic transport in polymer films. The authors also describe applications that use this technology, including polymer electrochromic devices, artificial muscles, light-emitting electrochemical cells, and biosensors, and they discuss the fundamental technological hurdles in these areas. The changes in materials properties and device characteristics due to ionic conductivity and electrochemical doping in electrically conductive organic materials, as well as the importance of these processes in a number of different and exciting technologies, point to a large untapped potential in the development of new applications and novel device architecture. This volume captures the state of the science in this burgeoning field. This book provides an overview of the newly emerged and highly interdisciplinary field of printed electronics • Provides an overview of the latest developments and research results in the field of printed electronics •

Topics addressed include: organic printable electronic materials, inorganic printable electronic materials, printing processes and equipments for electronic manufacturing, printable transistors, printable photovoltaic devices, printable lighting and display, encapsulation and packaging of printed electronic devices, and applications of printed electronics • Discusses the principles of the above topics, with support of examples and graphic illustrations • Serves both as an advanced introductory to the topic and as an aid for professional development into the new field • Includes end of chapter references and links to further reading This outstanding textbook provides an introduction to electronic materials and device concepts for the major areas of current and future information technology. On about 1,000 pages, it collects the fundamental concepts and key technologies related to advanced electronic materials and devices. The obvious strength of the book is its encyclopedic character, providing adequate background material instead of just reviewing current trends. It focuses on the underlying principles which are illustrated by contemporary examples. The third edition now holds 47 chapters grouped into eight sections. The first two sections are devoted to principles, materials processing and characterization methods. Following sections hold contributions to relevant materials and various devices, computational concepts, storage systems, data transmission, imaging systems and displays. Each subject area is opened by a tutorial introduction, written by the editor and giving a rich list of references. The following chapters provide a concise yet in-depth description in a given topic.

Primarily aimed at graduate students of physics, electrical engineering and information technology as well as material science, this book is equally of interest to professionals looking for a broader overview. Experts might appreciate the book for having quick access to principles as well as a source for getting insight into related fields. This comprehensive and unique book is intended to cover the vast and fast-growing field of electrical and electronic materials and their engineering in accordance with modern developments. Basic and pre-requisite information has been included for easy transition to more complex topics. Latest developments in various fields of materials and their sciences/engineering, processing and applications have been included. Latest topics like PLZT, vacuum as insulator, fiber-optics, high temperature superconductors, smart materials, ferromagnetic semiconductors etc. are covered. Illustrations and examples encompass different engineering disciplines such as robotics, electrical, mechanical, electronics, instrumentation and control, computer, and their inter-disciplinary branches. A variety of materials ranging from iridium to garnets, microelectronics, micro alloys to memory devices, left-handed materials, advanced and futuristic materials are described in detail. Electronic materials provide the basis for many high tech industries that have changed rapidly in recent years. In this fully revised and updated second edition, the author discusses the range of available materials and their technological applications. Introduction to the Electronic Properties of Materials, 2nd Edition presents the principles of the behavior of electrons in materials and develops a basic understanding with minimal technical detail. Broadly based, it touches on all of the key issues in the field and offers a multidisciplinary approach spanning physics, electrical engineering, and materials science. It provides an understanding of the behavior of electrons within materials, how electrons determine the magnetic thermal, optical and electrical properties of materials, and how electronic properties are controlled for use in technological applications. Although some mathematics is essential in this area, the mathematics that is used is easy to follow and kept to an appropriate level for the reader. An excellent introductory text for undergraduate students, this book is a broad introduction to the topic and provides a careful balance of information that will be appropriate for physicists, materials scientists, and electrical engineers. Principles of Electrical Engineering Materials and Devices has been developed to bridge the gap between traditional electronic circuits texts and semiconductor texts Unlike earlier electronic circuits, today's microelectronic devices demand that solder serve structural as well as electrical ends, and do so at relatively high temperature for years. Fatigue and failure of the solder has therefore become an issue in the industry. Nine studies from a May 1993 sympos Think like an electron Organic electronic materials have many applications and potential in low-cost electronics such as electronic barcodes and in light emitting devices, due to their easily tailored properties. While the chemical aspects and characterization have been widely studied, characterization of the electrical properties has been neglected, and classic textbook modeling has been applied.

This is most striking in the analysis of thin-film transistors (TFTs) using thick “bulk” transistor (MOS-FET) descriptions. At first glance the TFTs appear to behave as regular MOS-FETs. However, upon closer examination it is clear that TFTs are unique and merit their own model. Understanding and interpreting measurements of organic devices, which are often seen as black-box measurements, is critical to developing better devices and this, therefore, has to be done with care. Electrical Characterization of Organic Electronic Materials and Devices Gives new insights into the electronic properties and measurement techniques for low-mobility electronic devices Characterizes the thin-film transistor using its own model Links the phenomena seen in different device structures and different measurement techniques Presents clearly both how to perform electrical measurements of organic and low-mobility materials and how to extract important information from these measurements Provides a much-needed theoretical foundation for organic electronics Adopting a uniquely pedagogical approach, this comprehensive textbook on the quantum mechanics of semiconductor materials and devices focuses on the materials, components and devices themselves whilst incorporating a substantial amount of fundamental physics related to condensed matter theory and quantum mechanics. Written primarily for advanced undergraduate students in physics and engineering, this book can also be used as a supporting text for introductory quantum mechanics courses, and will be of interest to anyone interested in how electronic devices function at a fundamental level. Complete with numerous exercises, and with all the necessary mathematics and physics included in appendices, this book guides the reader seamlessly through the principles of quantum mechanics and the quantum theory of metals and semiconductors, before describing in detail how devices are exploited within electric circuits and in the hardware of computers, for example as amplifiers, switches and transistors. Dielectric Spectroscopy of Electronic Materials: Applied Physics of Dielectrics incorporates the results of four decades of research and applications of dielectric spectroscopy for solids, mostly for the investigation of materials used in electronics. The book differs from others by more detailed analysis of the features of dielectric spectra conditioned by specific mechanisms of electrical polarization and conductivity. Some original methods are presented in the simulation of frequency distributions (relaxers and oscillators), with methods proposed for various ferroelectrics frequency-temperature dielectric spectra. Also described are original methods for ferroelectrics on microwaves investigation, including the features of thin films study. The book is not burdened by complex mathematical proofs and should help readers quickly understand how to apply dielectric spectroscopy methods to their own research problems. More advanced readers may also find this book valuable as a review of the key concepts and latest advances on the topics presented. Introduces critical material characterization techniques by an expert with more than 40 years of experience in dielectric spectroscopy Reviews advances in dielectric spectroscopy methods to enable advances such as the miniaturization of electronics at the nanoscale Provides an overview of polarization mechanisms utilizing different models (i.e., oscillator and relaxation) An advanced level textbook covering geometric, chemical, and electronic structure of electronic materials, and their applications to devices based on semiconductor surfaces, metal-semiconductor interfaces, and semiconductor heterojunctions. Starting with the fundamentals of electrical measurements on semiconductor interfaces, it then describes the importance of controlling macroscopic electrical properties by atomic-scale techniques. Subsequent chapters present the wide range of surface and interface techniques available to characterize electronic, optical, chemical, and structural properties of electronic materials, including semiconductors, insulators, nanostructures, and organics. The essential physics and chemistry underlying each technique is described in sufficient depth with references to the most authoritative sources for more exhaustive discussions, while numerous examples are provided throughout to illustrate the applications of each technique. With its general reading lists, extensive citations to the text, and problem sets appended to all chapters, this is ideal for students of electrical engineering, physics and materials science. It equally serves as a reference for physicists, material science and electrical and electronic engineers involved in surface and interface science, semiconductor processing, and device modeling and design. This is a coproduction of Wiley and IEEE * Free solutions manual available for lecturers at www.wiley-vch.de/supplements/ Both a handbook for practitioners and a text for use in teaching electronic packaging concepts, guidelines, and techniques. The treatment begins with an overview of the electronics design process and proceeds to examine the levels of electronic packaging and the fundamental issues in the development Defects in Advanced Electronic Materials and Novel Low Dimensional Structures provides a comprehensive review on the recent progress in solving defect issues and deliberate defect engineering in novel material systems. It begins with an overview of point defects in ZnO and group-III nitrides, including irradiation-induced defects, and then look at defects in one and two-dimensional materials, including carbon nanotubes and graphene. Next, it examines the ways that defects can expand the potential applications of semiconductors, such as energy upconversion and quantum processing. The book concludes with a look at the latest advances in theory. While defect physics is extensively reviewed for conventional bulk semiconductors, the same is far from being true for novel material systems, such as low-dimensional 1D and 0D nanostructures and 2D monolayers. This book fills that necessary gap. Presents an in-depth overview of both conventional bulk semiconductors and low-dimensional, novel material systems, such as 1D structures and 2D monolayers Addresses a range of defects in a variety of systems, providing a comparative approach Includes sections on advances in theory that provide insights on where this body of research might lead Mechanical and thermal properties are reviewed and electrical and magnetic properties are emphasized. Basics of symmetry and internal structure of crystals and the main properties of metals, dielectrics, semiconductors, and magnetic materials are discussed. The theory and modern experimental data are presented, as well as the specifications of materials that are necessary for practical application in electronics. The modern state of research in nanophysics of metals, magnetic materials, dielectrics and semiconductors is taken into account, with particular attention to the influence of structure on the physical properties of nano-materials. The book uses simplified mathematical treatment of theories, while emphasis is placed on the basic concepts of physical phenomena in electronic materials. Most chapters are devoted to the advanced scientific and technological problems of electronic materials; in addition, some new insights into theoretical facts relevant to technical devices are presented. Electronic Materials is an essential reference for newcomers to the field of electronics, providing a fundamental understanding of important basic and advanced concepts in electronic materials science. Provides important overview of the fundamentals of electronic materials properties significant for device applications along with advanced and applied concepts essential to those working in the field of electronics Takes a simplified and mathematical approach to theories essential to the understanding of electronic materials and summarizes important takeaways at the end of each chapter Interweaves modern experimental data and research in topics such as nanophysics, nanomaterials and dielectrics "The third edition includes new topics and extended sections, such as diffusion, conduction in thin films, interconnects in microelectronics, electromigration, Stefan's radiation law, field emission from carbon nanotubes, piezoresistivity, amorphous semiconductors, solar cells, LEDs, Debye relaxation, giant magnetoresistance, magnetic data storage, Reststrahlen absorption, luminescence and white LEDs, and X-ray diffraction (Appendix). It also has a large number of new worked examples, numerous new homework problems, and many new illustrations and photographs. This text is one of the few books in the market that has the broad coverage of electronic materials and devices that today's scientists and engineers need."--Jacket. In early 1987 I was attempting to develop a CVD-based tungsten process for Intel. At every step ofthe development, information that we were collecting had to be analyzed in light of theories and hypotheses from books and papers in many unrelated subjects. Thesesources were so widely different that I came to realize there was no unifying treatment of CVD and its subprocesses. More interestingly, my colleagues in the industry were from many disciplines (a surface chemist, a mechanical engineer, a geologist, and an electrical engineer werein my group). To help us understand the field of CVD and its players, some of us organized the CVD user's group of Northern California in 1988. 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The course of lectures was designed for scientists and engineers "d th a ,wrking knowledge of electronic materials, who sought to extend their knowledge of the newest developments in the field. The rapid pace of research and exploratory development in electronic materials has led to a preSSing need for continuing awareness and assessment of new electronic materials, as well as renewal of information in the more traditional areas. Three classes of electronic materials were selected for the course. Semiconductors provide the foundation for solid state electronics and semiconductor devices represent the most sophisti cated and advanced application of materials science and engineering known to modern technology. Yet, the march of progress in semi conductors continues ,unabated - new semiconductor materials are in the research stage, new process technology is being developed, and new devices are being conceived. The second class of materials dealt with in the course, magnetic alloys and insulators, also has a firm application base; for example, computer performance is often measured in terms of the size of the magnetic memory. The tailoring of materials to provide particular combinations of desired magnetic properties is an integral part of the development of the electronics, just as in the case of semiconductors. This excellent volume covers a range of materials used for flexible electronics, including semiconductors, dielectrics, and metals. The functional integration of these different materials is treated as well. Fundamental issues for both organic and inorganic materials systems are included. A corresponding overview of technological applications, based on each materials system, is presented to give both the non-specialist and the researcher in the field relevant information on the status of the flexible electronics area. This book provides the knowledge and understanding necessary to comprehend the operation of individual electronic devices that are found in modern micro-electronics. As a textbook, it is aimed at the third-year undergraduate curriculum in electrical engineering, in which the physical electronic properties are used to develop an introductory understanding to the semiconductor devices used in modern micro-electronics. The emphasis of the book is on providing detailed physical insight into the microscopic mechanisms that form the cornerstone for these technologies. Mathematical treatments are therefore kept to the minimum level necessary to achieve suitable rigor. * Covers crystalline structure * Thorough introduction to the key principles of quantum mechanics * Semiconductor statistics, impurities, and controlled doping * Detailed analysis of the operation of semiconductor devices, including p-n junctions, field-effect transistors, metal-semiconductor junctions and bipolar junction transistors * Discussion of optoelectronic devices such as light-emitting diodes (LEDs) and lasers * Chapters on the device applications of dielectrics, magnetic materials, and superconductors Reliability and Failure of Electronic Materials and Devices is a well-established and well-regarded reference work offering unique, single-source coverage of most major topics related to the performance and failure of materials used in electronic devices and electronics packaging. With a focus on statistically predicting failure and product yields, this book can help the design engineer, manufacturing engineer, and quality control engineer all better understand the common mechanisms that lead to electronics materials failures, including dielectric breakdown, hot-electron effects, and radiation damage. This new edition adds cutting-edge knowledge gained both in research labs and on the manufacturing floor, with new sections on plastics and other new packaging materials, new testing procedures, and new coverage of MEMS devices. Covers all major types of electronics materials degradation and their causes, including dielectric breakdown, hot-electron effects, electrostatic discharge, corrosion, and failure of contacts and solder joints New updated sections on "failure physics," on mass transport-induced failure in copper and low-k dielectrics, and on reliability of lead-free/reduced-lead solder connections New chapter on testing procedures, sample handling and sample selection, and experimental design Coverage of new packaging materials, including plastics and composites Modern Electronic Materials focuses on the development of electronic components. The book first discusses the history of electronic components, including early developments up to 1900, developments up to World War II, post-war developments, and a comparison of present microelectric techniques. The text takes a look at resistive materials. Topics include resistor requirements, basic properties, evaporated film resistors, thick film resistors, and special resistors. The text examines dielectric materials. Considerations include basic properties, evaporated dielectric materials, ceramic dielectrics, metallization process, vacuum tightness, and materials with large values of permittivity. The text also discusses the reliability of discrete electronic components. The book also explains magnetic materials. Focus is on basic properties, preparation of ferrite materials, magnetization curve, and microwave properties of ferrite materials. The text is a valuable reference for readers interested in electronic materials. The present book on electrical, optical, magnetic and thermal properties of materials is in many aspects different from other introductory texts in solid state physics. First of all, this book is written for engineers, particularly materials and electrical engineers who want to gain a fundamental under standing of semiconductor devices, magnetic materials, lasers, alloys, etc. Second, it stresses concepts rather than mathematical formalism, which should make the presentation relatively easy to understand. Thus, this book provides a thorough preparation for advanced texts, monographs, or special ized journal articles. Third, this book is not an encyclopedia. The selection oftopics is restricted to material which is considered to be essential and which can be covered in a 15-week semester course. For those professors who want to teach a two-semester course, supplemental topics can be found which deepen the understanding. (These sections are marked by an asterisk [*].) Fourth, the present text leaves the teaching of crystallography, X-ray diffrac tion, diffusion, lattice defects, etc. , to those courses which specialize in these subjects. As a rule, engineering students learn this material at the beginning of their upper division curriculum. The reader is, however, reminded of some of these topics whenever the need arises. Fifth, this book is distinctly divided into five self-contained parts which may be read independently.

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- Archangels And Ascended Masters Doreen Virtue
- Social Problems In A Diverse Society Diana Kendall 6th Edition Book
- The School Recorder 1 Revised Edition Bk
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